

Serial No.: 10/546,622

Final Office Action dated: October 14, 2009

Response to Final Office Action dated: December 14, 2009

### REMARKS

In the Final Office Action dated October 14, 2009, in which claims 1, 4-5 and 9-10 were pending, the Examiner:

rejected claims 1, 4 and 9 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,727,307 to Gstöhl ("Gstöhl") in view of Japanese Patent No. JP 6-80377 to Matsuoka ("Matsuoka"); and

rejected claims 5 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Gstöhl in view of Matsuoka and further in view of U.S. Patent No. 2,708,246 to Dunn ("Dunn").

Applicants hereby amend claim 1, the only independent claim. Claims 1, 4-5 and 9-10 are presented for consideration in light of the following remarks.

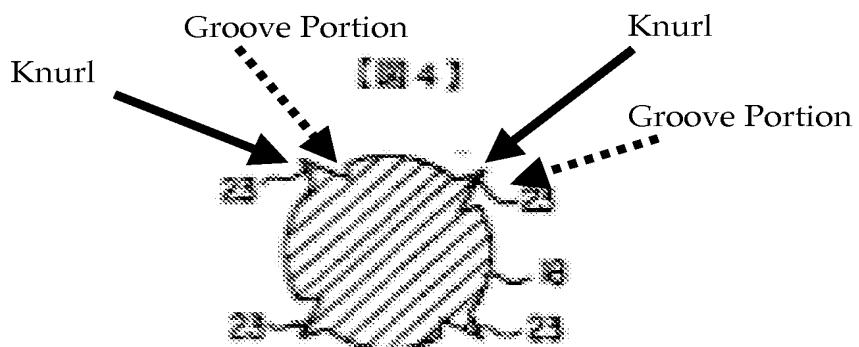
The Examiner rejected claims 1, 4 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Gstöhl in view of Matsuoka. A rejection under 35 U.S.C. § 103(a) is improper unless the Examiner establishes a *prima facie* case of obviousness. A *prima facie* case of obviousness is not established unless the prior art references, either alone or in combination, teach or suggest **each and every** claim recitation. Claims 4 and 9 depend from claim 1, and include additional recitations thereto.

Applicants' amended claim 1 recites, *inter alia*, that *a pair of groove portions is formed between a first adjacent pair of knurls at each position substantially adjacent to those knurls and another pair of groove portions is formed between a second adjacent pair of knurls at each position substantially adjacent to those knurls, and that the outer circumferential surface of the shaft is placed between each pair of groove portions and the first adjacent pair of knurls and the second adjacent pair of knurls.*

Gstöhl and Matsuoka, either alone or in combination, do not teach or suggest **each and every** recitation of Applicants' amended claim 1. For instance, Gstöhl does not teach or suggest that *a pair of groove portions is formed between a first adjacent pair of knurls at each position substantially adjacent to those knurls and another pair of groove portions is formed between a second adjacent pair of knurls at each*

*position substantially adjacent to those knurls; and that the outer circumferential surface of the shaft is placed between each pair of groove portions and the first adjacent pair of knurls and the second adjacent pair of knurls, as recited in amended claim 1. The Examiner admits this in the Office Action (Office Action, page 3, lines 3-6 and 10-11).*

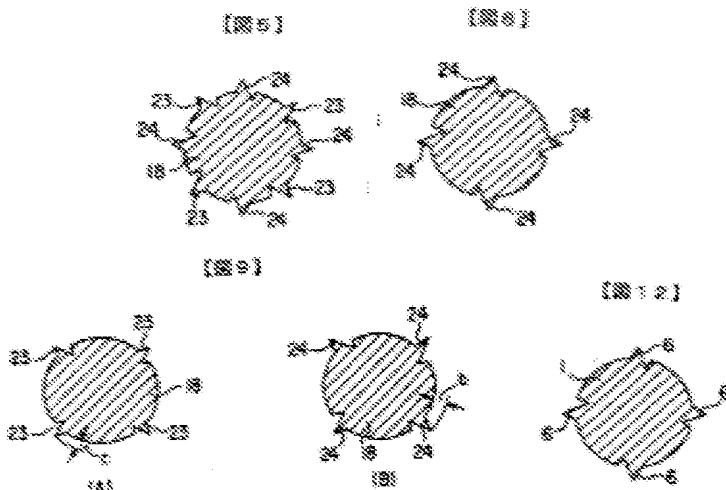
Matsuoka does not add to the teachings of Gstöhl, at least in that Matsuoka also does not teach or suggest *a pair of groove portions is formed between a first adjacent pair of knurls at each position substantially adjacent to those knurls and another pair of groove portions is formed between a second adjacent pair of knurls at each position substantially adjacent to those knurls*, as recited in claim 1. Instead, Matsuoka teaches a shaft having only one groove portion formed between each adjacent pair of knurls, as illustrated below:



*Matsuoka – Figure 4*

In other words, Matsuoka teaches a pattern of alternating knurl-groove portions that continues around the circumference of the shaft.

If anything, Matsuoka teaches away from *a pair of groove portions being formed between a first adjacent pair of knurls* because each relevant Figure of Matsuoka depicts the shaft in the same manner (i.e., having only one groove portion formed between each adjacent pair of knurls), as illustrated below:



Matsuoka – Figures 5-6, 9 and 12

Thus, even though Matsuoka conceives of alternative shaft designs, Matsuoka does not teach or suggest that *a pair of groove portions is formed between a first adjacent pair of knurls*, as recited in amended claim 1.

Since Matsuoka does not teach or suggest that *a pair of groove portions is formed between a first adjacent pair of knurls*, Matsuoka cannot possibly teach or suggest that *another pair of groove portions is formed between a second pair of adjacent knurls*, as also recited in amended claim 1. If anything, Matsuoka teaches away from this recitation for the same reason discussed above.

Further, since Matsuoka does not teach or suggest that *a pair of groove portions is formed between the knurls*, Matsuoka cannot possibly teach or suggest that *the outer circumferential surface of the shaft is placed between each pair of groove portions and the first adjacent pair of knurls and the second adjacent pair of knurls* as recited in amended claim 1. If anything, Matsuoka teaches away from *the outer circumferential surface*, as recited in amended claim 1, by teaching that the outer surface of the shaft is placed between adjacent knurl-groove pairings, as discussed above.

Thus, Matsuoka does not teach or suggest that *a pair of groove portions is formed between a first adjacent pair of knurls at each position substantially adjacent to those knurls and another pair of groove portions is formed between a second adjacent pair of knurls at each position substantially adjacent to those knurls; and that the outer circumferential surface of the shaft is placed between each pair of groove portions and the*

*first adjacent pair of knurls and the second adjacent pair of knurls*, as recited in amended claim 1.

In addition, the *shaft*, as recited in claim 1, overcomes the obviousness rejection over Gstöhl in view of Matsuoka because the *shaft* is manufactured using a process that exhibits superior results. In particular, the *knurls* and *groove portions* of the *shaft*, as recited in claim 1, are formed on the *outer circumferential surface* of the *shaft* using a single molding process performed by a molding apparatus 31 (Specification, Figures 6-8, paragraphs [0055]-[0073]). The molding apparatus 31 includes a first mold 32 and a second mold 33 having a first molding edge 43 and a second molding edge 45, respectively. The first molding edge 43 and the second molding edge 45 include a cutting face 51, 61 and an extension face 52, 62 formed to have an acute angle with respect to the cutting face 51, 61, respectively. Upon placing a shaft 14 on the first mold 32, such that the shaft 14 contacts the first mold 32 at contacts A, B, a ram 36 of the molding apparatus 31 drives the second mold 33 vertically downward toward a bottom dead center position. As a result of this downward vertical movement, the molding edges 43, 45 are simultaneously pressed against the outer circumferential surface of the shaft 14 thereby forming the knurls 27. Through the use of this process, the processing loads required to form knurls 27 can be reduced, processing accuracy can be improved, the interval between the molding edges 43, 45 can be narrowed thereby allowing the knurls 27 to be evenly spaced circumferentially about the shaft 14, and the knurls 27 can be formed in acute-angled triangles that are easily deformable thereby ensuring roundness of the commutator (Specification, paragraphs [0068]-[0072]).

The knurls located on the shafts of Gstöhl and Matsuoka, which exhibit an alternating knurl-groove pairings, cannot be formed using this single molding process. For instance, the knurls of Gstöhl and Matsuoka would get in the way of the downward motion of the second mold 33, frustrating the single mold process, as described above. Thus, Gstöhl and Matsuoka cannot possibly teach or suggest the *shaft*, as recited in claim 1, which is made using the single mold process that exhibits superior results.

Therefore, Gstöhl and Matsuoka, either alone or in combination, do not teach or suggest each and every recitation of Applicants' claim 1. Accordingly,

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Applicants respectfully submit that the rejection of claim 1 under 35 U.S.C. § 103(a) as being unpatentable over Gstöhl in view of Matsuoka is improper for at least these reasons, and should be withdrawn.

Since claims 4 and 9 depend, either directly or indirectly, from claim 1, and include additional recitations thereto, Applicants respectfully submit that the rejection of claims 4 and 9 under 35 U.S.C. § 103(a) as being unpatentable over Gstöhl in view of Matsuoka is improper for at least the same reasons, and should be withdrawn.

The Examiner rejected claims 5 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Gstöhl and Matsuoka in view of Dunn. Claims 5 and 10 depend, either directly or indirectly, from claim 1, and include additional recitations thereto.

As discussed above, Gstöhl and Matsuoka, either alone or in combination, do not teach or suggest that *a pair of groove portions is formed between a first adjacent pair of knurls at each position substantially adjacent to those knurls and another pair of groove portions is formed between a second adjacent pair of knurls at each position substantially adjacent to those knurls; and that the outer circumferential surface of the shaft is placed between each pair of groove portions and the first adjacent pair of knurls and the second adjacent pair of knurls*, as recited in amended claim 1.

Dunn does not add to the teachings of Gstöhl and Matsuoka, at least in that the Examiner does not even assert Dunn for these recitations (Office Action, pages 5-6, paragraphs 4-5). Thus, Dunn does not teach or suggest that *a pair of groove portions is formed between a first adjacent pair of knurls at each position substantially adjacent to those knurls and another pair of groove portions is formed between a second adjacent pair of knurls at each position substantially adjacent to those knurls; and that the outer circumferential surface of the shaft is placed between each pair of groove portions and the first adjacent pair of knurls and the second adjacent pair of knurls*, as recited in amended claim 1, in any way.

Therefore, Gstöhl, Matsuoka and Dunn, either alone or in combination, do not teach or suggest each and every recitation of Applicants' claim 1. Since claims 5 and 10 depend, either directly or indirectly, from claim 1, and include additional recitations thereto, Applicants respectfully submit that the rejection of

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claims 5 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Gstöhl in view of Matsuoka is improper for at least the same reasons, and should be withdrawn.

Having traversed each and every rejection, Applicants respectfully request claims 1, 4-5 and 9-10 be passed to issue.

Applicants believe that no fees are due in connection with this Response. If any fees are deemed necessary, please charge them to Deposit Account 13-0235.

Respectfully submitted,

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